Center Innovation Fund: LaRC CIF

Radiofrequency Plasma Synthesis of Boron Nitride Nanotubes (BNNTs) (Tier 1)

Completed Technology Project (2012 - 2013)

Project Introduction

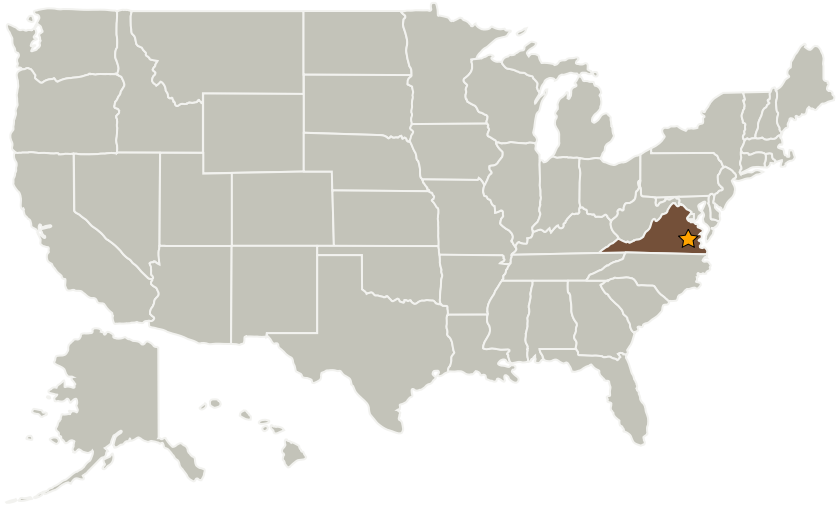
This project exploits the high temperature/inert gas characteristics of the RF plasma process to produce large quantities of pure Boron Nitride Nanotubes (BNNTs). For this project, the LaRC Radiofrequency Plasma Synthesis (RFPS) facility will be configured for deposition of metals using helium, to the in-situ synthesis of BNNTs using nitrogen.Plasma forming gas mixture and reaction temperature gradient conducive to high yield of high quality BNNTs will be established andBNNTs will be synthesized in a product form suitable as a structural reinforcing agent for nanocomposites, e.g. high aspect ratio. Additionally, dry fractionation methods will be developed to collect and separate end product based on physical characteristics, e.g. length.

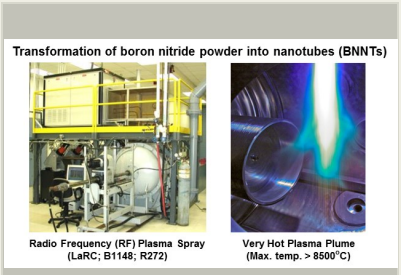
Represents an advance from laboratory-scale to pilot plant operations. Semi-continuous processing of high yield and high quality BNNTs

Anticipated Benefits

Improve the performance of ceramic matrix composites for thermal protection systems.

Primary U.S. Work Locations and Key Partners





Transformation of boron nitride powder into nanotubes

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Center Innovation Fund: LaRC CIF

Center Innovation Fund: LaRC CIF

Radiofrequency Plasma Synthesis of Boron Nitride Nanotubes (BNNTs) (Tier 1)

Completed Technology Project (2012 - 2013)

Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Tekna Plasma Systems, Inc.	Supporting Organization	Industry	Quebec, Outside the United States, Canada

Primary U.S. Work Locations
Virginia

Images

Transformation of boron into nanotubes (BNNTs)
Transformation of boron nitride powder into nanotubes *(https://techport.nasa.gov/image/16796)*

Project Management

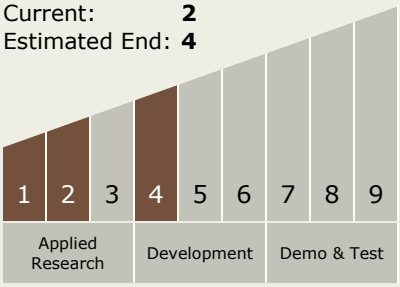
Program Director:
Michael R Lapointe

Program Manager:
Julie A Williams-byrd

Principal Investigator:
Stephen J Hales

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **4**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.6 Ramjet/Scramjet